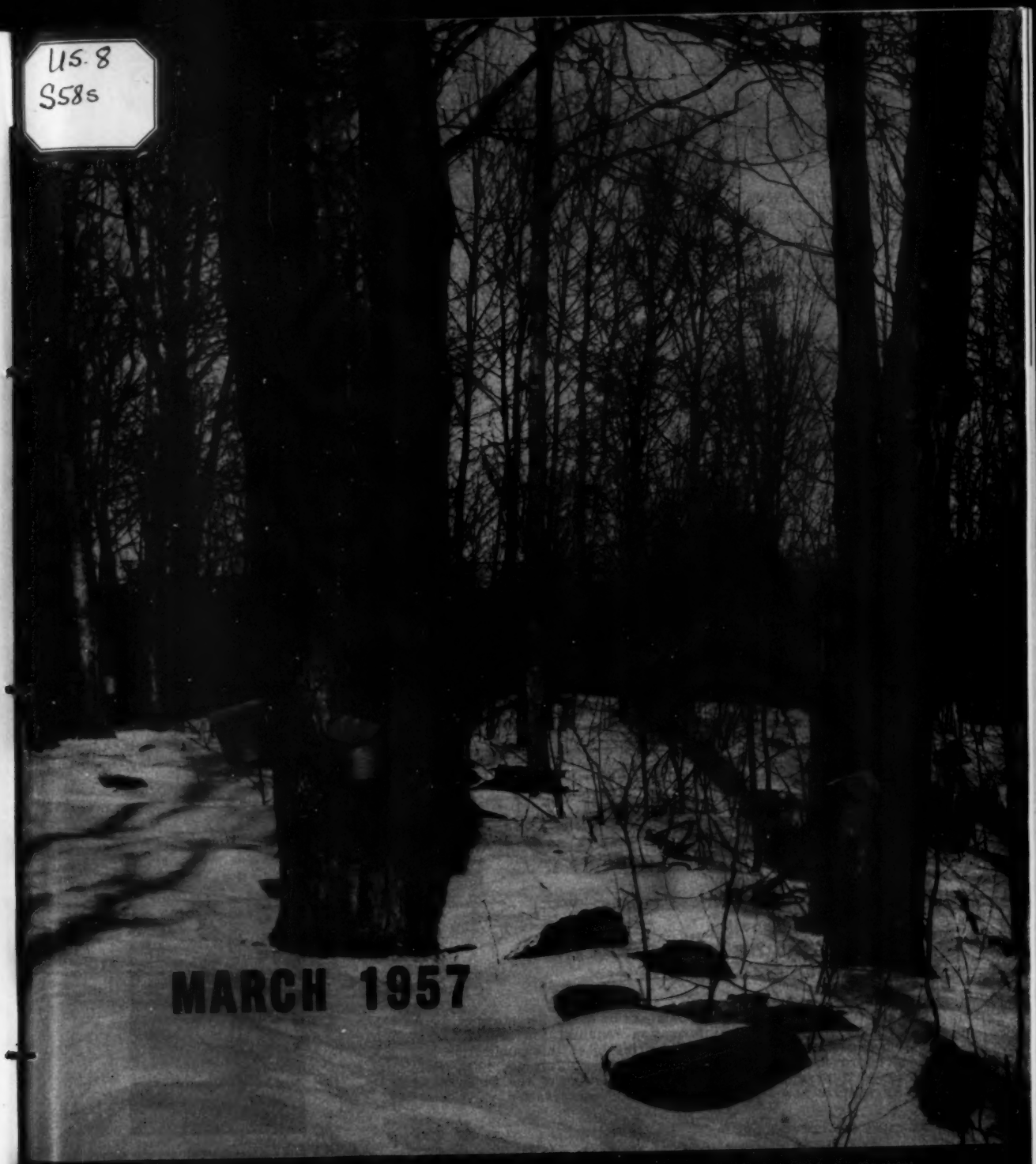
US 8
S58s



MARCH 1957

SOIL CONSERVATION

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION

MARCH—1957

VOL. XXII—NO. 8

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

	PAGE
SUGAR BUSH CONSERVATION *By Joseph Krivak*	171
WATER IS THEIR LIFE *By Phil Lovato*	172
IS HISTORY REPEATING? *By Fred J. Sykes*	174
FARM PONDS ON THE VIRGIN ISLANDS *By Alfred H. Oveson*	176
A STUBBLE MULCH FARMER *By Wally Bruce*	178
TENNESSEE STRIPS *By C. L. Roark*	180
A DREAM COME TRUE *By David O. Davis*	182
GROUP ACTION *By H. W. Riek*	184
PROGRESSIVE TRUCK FARMER *By W. Martin Muth*	186
BERMUDAGRASS WATERWAYS *By Virgil S. Beck*	187
INVENTORY IN NOVEMBER *By Clemens F. Weindorf*	190
IRRIGATION ENGINEERING—A Review *By T. H. Quackenbush*	192
CALIFORNIA AND THE SOUTHWEST—A Review *By B. W. Allred*	192

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

15 CENTS PER COPY $1.25 PER YEAR

FOREIGN—$1.75 PER YEAR

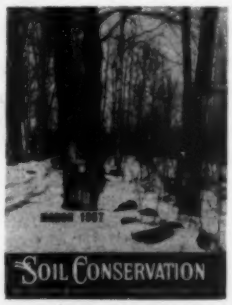
25 percent discount on orders of 100 or more subscriptions mailed to a single address

AGRICULTURE IN BRITAIN.—Agriculture is one of Britain's largest and most important industries, employing three-quarters of a million people and using about 48 million of the 60 million acres of land. Output is now more than 50 percent higher than before World War II. Production of cereals is 80 percent higher. Britain now produces 50 percent of its bacon needs as compared with 30 percent prewar, and nearly 70 percent of its meat supplies, compared with 50 prewar. Yet, about one-half of Britain's total food supplies (including coffee, sugar, tea, cocoa, etcetera) still have to be imported.

—British Information Service

GRASS SEED TO SOUTH AMERICA.—The United States exported more than 2.3 million pounds of grass and legume seeds to South America during the 1955-56 crop year. Chile and Uruguay were the largest buyers, and all the South American countries, except Paraguay, imported some.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Sugar maple grove at maple syrup time. (See article on opposite page "Sugar Bush Conservation.")

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Sugar Bush Conservation

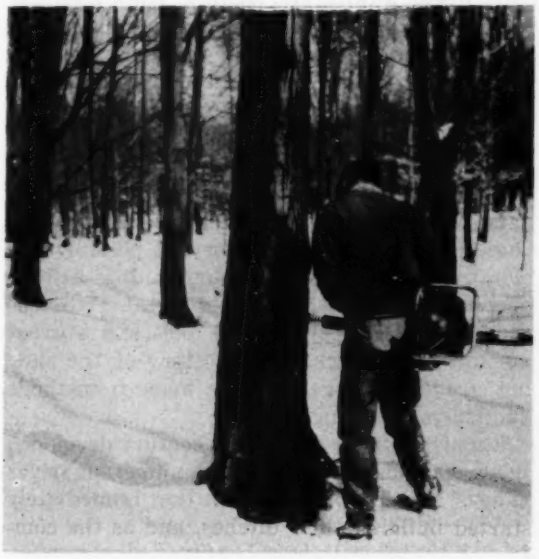
By JOSEPH KRIVAK

THERE'LL be a lot more sweetness in Erie County, Pa., when maple syrup time comes in March. Then activity reaches a high pitch. Many farmers work 16 hours a day harvesting their first farm crop of the new year. Erie County's annual syrup production is 20,000 gallons, 20 percent of the State's output. At today's prices this gives the county a hundred thousand dollar income.

The sugar bush comes to life when the sun's rays break the siege of old man winter. Temperature formulas notwithstanding, persons running a bush know the smell and feel of the first run. Buckets and spiles are checked, the woodpile is made ready, and the horses leave the barn.

Old dobbin has held his position in this farming operation. There are still 3,000 horses on Erie County farms. Many of these earn their keep during the sugar season. A team of well-trained horses greatly increases the speed of setting up the bush and gathering the sap.

Note.—The author is work unit conservationist, Soil Conservation Service, Erie, Pa.



Harry Burrows tapping a sugar maple.

Sugarhouse of Arthur Harwood.

Modern methods and long used practices mix agreeably in the sugar bush. Tapping the tree with a power rig, beats hand drilling. With a power drill, it is a 2- or 3-second job. The spout is driven, bucket and lid hung, and the sugar bush is in business. That is, after this tree-by-tree process has been repeated from 500 to a few thousand times.

Then, the weather becomes ruler of the sugar bush. Anyone who makes a living from nature, be it farmer or fisherman, is keenly weather conscious. Among the weather conscious farmers, sugar makers rank high. With cold nights and warm days, the sap plink-plunks into the buckets and is soon ready for the sugarhouse.

The next job is to get the sap to the sugarhouse. Anyone who has carried a full sap bucket in a foot of snow knows this isn't easy. The trusty team of horses pulling a sled with a mounted tub is the most common sight. When topography permits, gravity systems of pipelines make the job easier. For every 35 gallons of sap going into the sugarhouse, only 1 gallon comes out as syrup.

Horses may still be used to collect the sap, but mechanization is catching up with sugarhouse operations. Harry Burrows, the largest

Sugar bush of Arthur Harwood at maple syrup time.

producer in these parts, doesn't have a woodpile anymore. He switched over to oil-fired evaporating pans. "This beats throwing chuck wood," he explains. "All I do now is turn a valve. I save time two ways. There is no woodpile to get ready beforehand and don't think cutting 20 cords of wood isn't work. Then, I can boildown in half the time. No more working all night in the sugarhouse for me. Controlled heat has other advantages too. The syrup comes out not only faster but lighter in color. That's Fancy grade syrup."

Arthur Harwood, Wattsburg, operates a 75-acre bush. "I manage my sugar bush for high production," he states. "Like my dairy herd, it's the individual producer that counts. You can't get good pasture and a good sugar bush from the same land. You wouldn't expect your cow to be a good milker unless she was cared for. Well, the same applies to a maple tree."

Dale Forbes, a director of the Erie County Soil Conservation District, hangs 2,000 buckets in his sugar bush. He likes to talk about sugar bush conservation. He says: "The first thing I did when I bought the farm was to fence out the cows. Now I've got a stand of young maple trees. I've noticed many old sugar bushes that have quit producing. Twenty years ago they were among the finest in this area. If the trees had been treated half as well as the cropland on those farms, they would still be putting money in the farmers' pockets. A little commonsense and conservation could have saved those bushes. Now, even the sawmills don't want them."

Water Is Their Life

Community irrigation systems, in use for centuries, have recently been improved by modern conservation irrigation engineering.

By PHIL LOVATO

THE success of a small farmer in the irrigated valleys of the Eastern Taos Soil Conservation District, in northern New Mexico, depends upon how much irrigation water he gets and how well he uses it. For more than 300 years community irrigation ditches, or acequias as they are known locally, have furnished the water needed to irrigate fields of corn, wheat, alfalfa, and pasture. These acequias carry water diverted from the numerous mountain streams originating in the snow covered areas of the Sangre de Cristo Mountains.

There are about 150 community ditch systems in the Eastern Taos district and proper management of water for irrigation is essential to the economic life of most of the 12,000 inhabitants. What has been done to build and improve these ditch systems is a story of possibly the oldest cooperatives in the country. It is a story of what the Spanish colonists of the 17th century did with practically no tools and a great amount of patience. It is a story of the slow but gradual change to more modern methods and irrigation structures.

Spanish settlers of the 17th century developed their communities along the numerous river valleys. Records indicate that they immediately started building their ditches, and as the com-

Note.—The author is work unit conservationist, Soil Conservation Service, Taos, N. Mex.

munities grew the old ditches were made longer and new ones built. These acequias were for the benefit of all inhabitants of a village. Each man had an equal vote in matters pertaining to the irrigation system and each contributed labor or cash according to the amount of land he irrigated. Once a year water users in each system got together and elected three landowners to take charge of their irrigation system, and a ditch boss or majordomo to supervise the work and distribute the irrigation water.

The original ditches were laid out without the use of surveying instruments by allowing a trickle of water to follow along the flattest possible grade. How successful this was is attested by the fact that most of these ditches have remained in the same locations throughout the years.

But the irrigation water had to be diverted from streams that sometimes triple in size during the spring runoff or during summer flash floods. And the ditches had to be carried across arroyos and around steep hills.

Across the streams they used brush and rock dams that had to be rebuilt sometimes two or three times a year due to damage by floods. Across the arroyos, the settlers placed flumes made of tall trees hollowed out by hand. But erosion widened the arroyos and often the log flumes collapsed. Then, too, the streams flow in abundance in early spring when moisture is plentiful in the irrigated valleys. But the water supply gets short during the irrigating season.

These conditions created real problems for most communities. A great amount of time had to be spent by each water user in repairing the rock and brush diversion dams, the flumes, and the main ditches. Manuel Rodrigues, a farmer and majordomo of the Chamisal community system, estimates that $6,000 worth of labor alone was needed each year, before improvements were made to keep the system in working order. Besides this, irrigation water had to be cut off during the critical irrigation period.

Farmers in the Taos Soil Conservation District working to replace wooden flume with one of metal.

Check drops to control erosion under construction in an irrigation ditch.

Some of these conditions still exist, but community leaders have been doing something about them. When the Eastern Taos Soil Conservation District was organized in 1941 they prevailed upon district supervisors to give high priority to this part of their soil and water conservation program. This was done, and an intensive program was started by the district board and the ditch commissioners of the community systems. Soil Conservation Service technicians, assigned to the district, did the designing and planning. Water users built semipermanent log-crib or more permanent concrete diversion dams. Structures for metal flumes were built to replace the old leaky log flumes. Rock and brush structures were constructed to control erosion and prevent widening of arroyos where the ditches cross. To obtain the best use of the water when the supply is short, more than 140 overnight storage reservoirs were built.

Overnight storage reservoir in the Taos Soil Conservation District.

This phase of the conservation work of the district and community ditch systems has continued though not in as high priority as when the district was organized. A large portion has been completed. Since the two organizaitons got behind the program, 100 ditch systems have participated. The following have been constructed: 23 permanent diversion dams, 20 metal flumes, about 200 large diversion headgates, and more than 500 small erosion control dams.

The work has been done by the water users themselves, and it has taken a lot of time and labor. But the improvements are paying off through less annual maintenance and assurances of a more efficient delivery of irrigation water to their farms.

Is History Repeating?

The people of Greeley County, Kansas, in the heart of the Dust Bowl, find themselves confronted with much the same situation as 20 years ago.

By FRED J. SYKES

HISTORY shows signs of repeating in Greeley County, Kans., along the western border of the State. The fight against wind erosion is shaping up. The lines are drawn. It is a fight the citizens of Greely County expect to win just as they did 20 years ago.

The scene now, to some of the oldtimers like Jess Taylor, is much like it was in the thirties when drought and wind teamed up to whack at the land and people with merciless blows. He considers it pretty much a renewal of the campaign he helped to lead in the dry years two decades ago.

Taylor is now a member of the Kansas House of Representatives where last year he was chairman of the agricultural committee. He came to Kansas from Texas' high plains in 1930 and bought 320 acres of land southwest of Tribune.

Yields in 1931, Taylor recalls, were mighty good—too good, in fact. The flood of grain throughout the wheat country broke the market to giveaway lows. Farmers couldn't get enough for their crop to pay costs. Taylor remembers that after paying expenses he had $300 left. He was better off than most.

Note.—The author is state conservation, Soil Conservation Service, Salina, Kans.

Then the dry years started. Crops failed to make growth to protect the land. The blowing began and got worse and worse.

In 1936 Greeley County citizens decided to act. They could do something about the blowing —and would. They chose Jess Taylor to head their committee on planning.

Taylor had served on the Agricultural Adjustment Administration committee for his county. He was widely known as a man who knew the agriculture of the Plains. He had a way, too, of breaking problems down to solvable parts. He had the confidence of the farmers of the county.

Leaders of agricultural agencies and organizations made up the committee. The first step was a series of meetings to explain the problem. The help of everyone was needed. The immediate problem was to get all cropland under emergency tillage.

Lack of equipment was a handicap. The committee decided on a hurried check of all equipment in the county that would be useful. There were too few tractors, and fewer listers and chisel-type tillage tools. But they made good use of what they had.

The county AAA committee, with Harry Ridlen as chairman, wrote to every landowner who lived outside of the county to explain the situation. Absentee owners were asked to cooperate by leasing their land to local people. Federal funds paid 25 cents an acre for the tillage done.

Only six owners refused, Taylor recalls. But in these cases Kansas' "soil drifting" law, passed 3 years earlier, was invoked. The law provided for doing the needed tillage, the cost to be assessed along with taxes against the land.

Jess Taylor.

Aerial photograph shows stripcrop patterns for a part of Greeley County.

The mass tillage started at the southern edge of the county. All available equipment and manpower was put in action. It moved slowly northward. Well before the period of hard blowing arrived, the job was done.

The AAA committee made stripcropping a requirement for Federal help of any kind. Ten to twenty rods of wheat or sorghum, and a similar strip in fallow was the pattern. It worked wonders. Many farmers kept on with it when better years came. It is making the new fight an easier one.

Is history repeating?

"Yes, to a certain extent," Taylor agrees. "We have much the same problem. We have had several meetings already. Nearly all the cropland has been chiseled or listed for emergency protection. The Agricultural Stabilization and Conservation Committee has set up a $2.50 an acre payment for stripcropping. Our soil conservation farmers have been making good use of what crop residues they have been able to grow."

Some of this is obviously due to the work of an organization that wasn't there before. It is the Greely County Soil Conservation District. Battling wind erosion is one of its main objectives. M. A. Tucker, who farms near Tribune, is chairman of the district board. He is the board's representative on the county planning committee.

"We'll come through this fight in better shape than we did before," Taylor promises. "We know more about the job. Most of our people, instead of being broke and discouraged as they were before, now have money in the bank to tide them through, and our farm equipment is better and we have more of it. They believe in this country, too. The Federal Government is backing us now with the technical help we need as well as with cash. ACPS and the Soil Bank are big factors in our favor. Yes, the scene is different now."

The fields of Greeley County show Taylor is right: the stripcropping, the thousands of acres of crop residues, the grass on the thin and eroded soils. Greeley County is going to win this time, too, although there is a big job ahead.

FARM PONDS ON THE VIRGIN ISLANDS

Farm ponds on St. Croix, the largest of the Virgin Islands, have helped solve the livestock water problem and rejuvenated wells and springs.

By ALFRED H. OVESON

ST. CROIX, the largest of the American Virgin Islands, is slightly more than 22 miles long in an east-west direction, 6 miles in width at the widest portion, with a land area of about 82 square miles. The island can be divided into 4 important sections according to its physiographic features: (1) The northwestern mountain area, (2) the southwestern and south central coastal plain, (3) the north central hilly area, and (4) the eastern mountainous area.

The mountain areas include land that has sufficiently gentle slopes to allow cultivation. The northwestern area has many small valleys adjacent to the coastal plain. Natural drainage in the mountainous area ranges from good to poor.

The natural vegetation varies in the different sections. The northwestern area has fairly dense tropical forests. The central and southern sections are covered by hurricane grass, which is considered an inferior type of pasture grass. The eastern section is covered by thorny brush and cactus.

Newly constructed pond on St. Croix, V. I.

The average temperature is about 78°. The total precipitation varies greatly in the various areas, and from year to year. The rainy season usually starts in September and ends during January. Small showers sometimes fall during April, May, and June. The heaviest rainfall is found in the northwestern wooded areas, with averages from 45 to 60 inches. The southern and eastern areas usually average from 5 to 20 inches of rainfall a year. In the central area where most of the fertile lands are found, the rainfall ranges from 20 to 40 inches.

The prevailing winds sweep the island lengthwise from an easterly to westerly direction. Evaporation has been calculated to be 72 inches a year in the exposed areas.

Water for human consumption is obtained by collecting rainwater in cisterns from the roofs of houses. For livestock, wells have been dug to a depth of 100 feet or more.

With rainfall unevenly distributed during the year, livestock suffer immensely during droughts. Test drillings for artesian wells, made in 1940 and 1941, failed to find sufficient water stored in caverns below the ground. Depths up to 1,506 feet, dug by a rotary drill, showed the quality of the water to be salty and unfit for use by livestock. Most of the ground water contains a moderately high mineral content.

Note.—The author is conservation aid, Soil Conservation Service, Christiansted, St. Croix, V. I.

During heavy rains most stream beds carry a full flow of water and discharge it into the sea. Practically all of the streams are intermittent. The streams in the northwestern area flow for many months after the rainy season, due to their being fed by springs. In the eastern area, due to lack of sufficient rainfall, they flow for only a limited time after heavy rainfalls.

Well water is generally used solely for domestic purposes and not for human consumption. A few wells, which produce a fairly good quality of water, are occasionally used for drinking purposes by the farm folk.

Due to prolonged droughts and poor condition of pastures, the situation became grave and many animals died for want of food and water. Dug or drilled wells failed to produce sufficient water to tide them over droughts, and many farmers decided that they would have to quit raising livestock.

With the formation of the soil conservation district, this critical situation was discussed. In the meantime, four small earth ponds were built by the Works Progress Administration and the Soil Conservation Service in 1941. These ponds, though small, were a godsend to the farms on which they were built. They not only furnished sufficient water to the farms but other farmers' livestock were saved by hauling water from the ponds. The opinion of many farmers, at that time, was that the earthen dams would be washed away at the first heavy rainfall. Today they are still in excellent condition and are furnishing water to a group of farmers.

This initial pond construction being so successful, a few other farmers decided to invest in the construction of farm ponds. The Soil Conservation Service was asked to assist the farmers in locating sites, staking out, and supervising their construction.

Machinery for construction consisted of bulldozers and earth pans. Under the Agricultural Conservation Program farmers participating in this were paid on an earth moved basis of 12 cents per cubic yard.

During 1946–47, on the farm of Ward M. Canaday, 5 ponds were constructed in various sections, ranging from a capacity of 2 million to 4½ million gallons of water.

Contour furrows, also, were laid out and cut in pastures to save the water from rushing down the slopes into the stream beds.

With these ponds filled to capacity, it was noted that many wells that were dry for years, were rejuvenated to the extent that some of

Pond near Christiansted, St. Croix, constructed in 1952 and stocked with fish.

them overflowed. Streams were kept flowing for longer periods, too.

With the results seen from so few ponds constructed, the district supervisors, the Soil Conservation Service, and the Virgin Islands Corporation, with the assistance of many livestock raisers, formulated a plan. This plan called for the construction of approximately 150 farm ponds, plus land clearing of undesirable brush, and was presented to Congress in 1949.

This overall plan met the approval of Congress and outright grants were made to carry out the program.

The district supervisors met and scheduled 10 ponds at a time for construction in an area. SCS technicians located the most desirable pond sites, made surveys of soils for building materials, and technically supervised the construction.

By August 1956, a total of 77 ponds had been constructed under the program.

The smallest pond constructed has 0.2 acre-feet, or 60,000 gallons capacity, and the largest has about 95 acre-feet or 30 million gallons capacity. Approximately 547 million gallons will be stored in all ponds now on St. Croix.

Most of the ponds not only furnish water for livestock but also serve as fish ponds. After completion, and as soon as a pond is filled to capacity, it is checked often to see if it will hold water. As soon as a pond keeps a constant level of water, small blackmouth bass, bream, and minnows are placed in it to furnish food for the table of the farmer, and for sport fishing.

The construction of farm ponds in the highlands made it possible for vast quantities of water to be stored underground due to some seepage. Many small streams that had not flowed for years, suddenly started to flow and many springs became active. The low lying lands, too, showed a vast improvement due to the underground flow of water. Many wells that produced salty or brackish water, were vastly improved, some to the extent that farmers get their home supply from them.

The farmers are proud of their ponds. They like to show the ponds to their friends, tell of their capacity, what fish is used to stock them, and, as usual, the size of the "one that got away."

The water situation has been solved somewhat by farm pond construction, improved pastures, and proper management of the farm.

There are still many ponds to be constructed, however, and it is hoped that eventually all runoff from the mountains will find its way into ponds. This is the wish of the farmers of this beautiful island.

A STUBBLE MULCH FARMER

By Wally Bruce

IN northeastern Colorado stubble mulch farming and Pete Loos seem synonymous. Pete has used this conservation practice since 1942. He says his interest was first aroused by a publication on the subject by Duley and Russell. The possibilities of the practice looked good. With the help of Soil Conservation Service technicians he rigged up his first subsurface tillage machine.

The machine that Loos used in 1942 is quite a contrast to what he uses today. He took an old Peacock drill, put 2 extension beams on it, and equipped it with 24-inch sweeps. "They did a good job," Pete recalls. "It was such a good job of subsurface tillage, that the neighbors couldn't figure out what I was doing, working back and forth in the field without disturb-

Note.—The author is area conservationist, Soil Conservation Service, Sterling, Colo.

Pete Loos (standing) and his son-in-law in a stubble mulch field that has been tilled once.

Stubble mulch field ready for wheat drilling on the Pete Loos farm.

ing the soil. They soon found out that I was getting results. We had a heavy rain. The land I had worked with the sweep, took it all. The land worked with a one-way had runoff.

"I had quite a little trouble the first year. The ground was uneven. My sweeps would catch stubble and drag. It was hard work. The controls on the machine were all hand operated. A day's work in the field with that machine was all that I wanted.

"The equipment today is quite an improvement. My new machine is hydraulically controlled. Today, doing stubble mulch farming is much easier. It took me quite awhile to get used to the idea of waiting to get into the field after a rain. My neighbors, using clean fallow methods, were in the field at least 2 days ahead of me. Clean fallowed land lost its surface moisture quickly. The mulch on my land kept the surface wet. I guess the lower cost of farming my way finally helped me get over those jitters. I only worked my land an average of four times. The clean fallow method required eight or nine operations. I finally decided that cutting down operating cost was compensation enough for my uneasiness over a slow start.

"While cutting farming costs is very important, I get the biggest kick out of seeing how this practice holds the soil. Since I have used stubble-mulch farming, I have had no soil blowing. My land is rolling and I did get some runoff. In addition to stubble mulch farming. I've contour stripcropped my land. While I feel that stubble mulch farming is one of our most important conservation practices in the Plains, no one practice will do the entire job. It takes a combination of practices depending upon the needs of the land."

Loos has done a good job of soil conservation in other ways too. This is evidenced by the fact that his farm was judged the best soil conservation job, of the lower South Platte watershed, in a recent soil conservation contest.

The past 2 years, moisture has been about 50 percent of normal. It was particularly low in the New Haven community. Most of the wheat in that locality burnt badly. Pete had an average yield of 19 bushels per acre. In 1956, with moisture still very low, Loos had a 22-bushel average. The crop was uniform over the entire field. Many of the surrounding wheatfields had dry spots where the wheat fired.

Since Loos has been using stubble mulch farming, his results have been extremely gratifying. In 1945, Pete had wheat that made 50 bushels per acre. In 1946, he had wheat that averaged 40 bushels per acre on all his land. In fact, in the last 12 years he has averaged 30 bushels, as compared with 18.6 bushels average yield for Logan County.

In 1951, Pete Loos won the milling and baking contest on wheat. In 1952 and 1953, he was designated as Wheat King at the Colorado Seed Show held in Denver. He has always collected a premium on the protein content of his wheat.

(Continued on Page 191)

South Platte Soil Conservation District supervisors in a wheatfield on the Loos farm that produced 50 bushels per acre.

Tennesse S

Stripcropping for soil conservation a incre rapidly on Tessee

By C. L. OARK

CONTOUR stripcropping has been established on about 10,000 acres in Tennessee soil conservation districts during the past 2 years. The curving, alternating strips have added beauty to the rural landscape and dollars to the farmers' pocketbooks.

The best place to see the long, even-width strips hugging the sloping fields is from the air. But the best place to learn how farmers are using stripcropping, and to find out what they think about it, is by talking to the farmers themselves.

O. K. Armentrout, cooperator with the Washington County Soil Conservation District says: "You won't have any erosion when you stripcrop. Also, planting my corn on the contour in a strip rotation increased yields by a third. And, it was easier on my machinery and took less gas."

Another farmer impressed by the amount of gas he saved by contour stripcropping is Bill Haddox, cooperator with the Blount County Soil Conservation District. Haddox works 225 acres of his dairy farm in a system of contour strips. He recently stated: "I use 20 gallons of fuel in 2 days of tractor work on a stripcropped field that always took 30 gallons by the old method of cropping in a solid block. And, there's no washing after heavy rains."

John Wallace of the Johnson County Soil Conservation District could have told Tennessee farmers years ago about stripcropping. He's been at it since 1937. Now 80 years old, Wallace said: "If I were a young man just starting to farm, the first thing I'd do would be to lay out a strip system on the sloping land I intended to crop. It's the best way I know to keep the soil on a sloping field." Even though Wallace grows crops on land pretty steep for cultivation, he's making 3,000 pounds of tobacco, 80 to 90 bushels of corn, and 4 to 5 tons of grass-alfalfa hay to the acre.

In the Putnam County Soil Conservation District, Zeb and Clay Warren, who started stripcropping "after a fashion" about 10 years ago, decided 2 years ago to "shoot the works" with the modernized, uniform-width strip system. They said: "We liked strip farming well enough to tear out fences and combine 6 fields into 2 units of strip-rotation, totaling 100 acres. Stripcropping makes better crops and the hand-

ling
in a
We w
W
Cons
on 1
tellin
a goo
every
cropp
way
In
trict,
conse
super
grain
of ro
maki
to th

Note.—The author is state soil conservationist, Soil Conservation Service, Nashville, Tenn.

se Strips

n a increased crop yields is spreading Tennessee farms.

C. L. OARK

ling of machinery easier. We can plow more in a day because our rows are 1½ miles long. We wouldn't go back to the old way of farming."

William Hawks, in the Wilson County Soil Conservation District, is using strip rotations on 100 acres of his 565-acre dairy farm. In telling about it recently, he said he figured it's a good practice anyway you look at it. "Most every farmer in the county ought to be stripcropping the sloping cultivated land," is the way he puts it.

In the Maury County Soil Conservation District, Allison Thompson was recently named conservation farmer of the year by the district supervisors. Thompson grows alfalfa and small grain in alternating contour strips on 45 acres of rolling land. Thompson says he's already making 10 to 15 bushels more oats and barley to the acre.

Milford Warman in the Henry County Soil Conservation District had been having a lot of trouble handling his "pan" land with terraces because of wet spots. The Soil Conservation Service technician there helped Warman replace terraces with a system of contour strips. Warman stated simply, "It sure is all right. Had the best crop on that field I ever had. Didn't have those wet spots either."

A lot of other farmers over the State also are learning that farming their sloping cropland in a contour strip system not only protects the land but also results in bigger harvest. One is H. B. Whitnel of the Obion County Soil Conservation District. District supervisors met on his farm recently. Impressed at what they saw, they broadcast the story over radio station WENK. L. H. Crowell of the Marion County Soil Conservation District is another farmer who "likes stripcropping fine because the land doesn't wash anymore and it's easier to work."

These are the opinions and comments of just a few farmers. Everyone with stripcropping has a good word to say for it.

Yields have increased—Less soil is lost—More moisture conserved—Should have been doing it for the past 20 years—Highly pleased with results, are some of the comments.

In view of the esteem in which stripcropping is held and the good results it is producing for those using the practice, it is believed that stripcropping on Tennessee farms will be substantially increased during the coming year.

A Dream Come True

A biology professor, with cooperation from State and Federal Agencies, helps create a conservation training center for school teachers of North Dakota.

By DAVID O. DAVIS

A campfire and a dream. That was the beginning 7 years ago. Now it is North Dakota's State Conservation Training Center, located in Ritchie Memorial Nature Camp, on the shore of Lake Ashtabula near Valley City.

The Center has seven buildings—bunkhouses and baths, a kitchen and messhall, a recreation building, and a classroom and laboratory. There are driveways and parking places for automobiles. There is a landing for several boats, and a diving- and fishing-raft.

There were six students at first. Their leader and teacher was Dr. Marvin A. Leraas, professor of biology at Valley City State Teachers' College.

Leraas was concerned that so many people were going into the teaching profession unprepared to teach conservation. So in 1949 he offered a field biology course during the college summer session. The course was to be studied from the standpoint of conservation.

Note:—The author is field information specialist, Soil Conservation Service, Denver, Colo.

Professor Marvin A. Leraas.

They camped near the Lake Ashtabula Dam. Tents were their shelter. The campfire cooked their food and provided light for their discussions after sunset. Their laboratory was the great outdoors.

The enthusiasm of this small group of students persuaded Leraas to offer the next summer a course in conservation education designed to prepare teachers to teach the material required in the state elementary course of study. Eight teachers attended in 1950 and 1951. These courses, too, were held outdoors.

The success of the courses convinced Leraas and the college authorities that they needed more than just a temporary camp. On April 17, 1952, the college obtained a 20-year lease from the U. S. Army Corps of Engineers of a tract near Lake Ashtabula.

That same year members of the National Wildlife Federation, and state and county chapters, contributed to a fund of $3,000 for initial improvement of the campsite. The camp was dedicated to the late Dave Ritchie of Valley City. General Ritchie, a former president of the North Dakota Wildlife Federation, was an ardent proponent of conservation education.

At the dedication, Leraas said: "It has been my feeling for a long time that North Dakota has been negligent in providing facilities for training teachers to have a greater appreciation of the urgent need for conservation education in the public schools. The Ritchie Memorial Nature Camp has been set aside, and will serve, in part at least, to attain this educational objective."

The camp is in Barnes County. The Barnes County Commissioners lent dirt-moving equipment to construct an approach to the camp and to level an area for the first building that then became a combination classroom-kitchen-messhall. Then two small shacks were moved to the

camp site and refurbished. These buildings were just barely large enough to hold four double-deck bunks and leave room to stand upright between the bunks. But they provided sleeping quarters for a number of teachers during the years to follow.

Two sessions were held in 1952. Twenty-five teachers attended the first session and thirty-three the second. The main classroom was crowded. Of course, most classes were still held outdoors. But people had to come inside when it rained. So a large tent was set up for a classroom during the 1953 sessions. And a 20-bed bunkhouse was built.

Three sessions were held in 1953 with 82 teachers attending. Meantime the camp had attracted attention throughout the State. The North Dakota Association of Soil Conservation Districts recommended that districts of the State provide scholarships to teachers who wanted to take a course at the camp. Through 1956 North Dakota districts have provided 150 such scholarships.

Some districts furnish scholarships to as many teachers within their county as wish to attend. The majority, however, offer four per year. Other agencies also provided scholarships.

The students to date have been mostly rural teachers. Someday it is hoped to have the same response from urban areas.

Leraas was no longer carrying the whole instruction load. Representatives of the North Dakota State Game and Fish Department, the North Dakota Geological Survey, the Bureau of Reclamation, Bureau of Fisheries, Extension Service, and Soil Conservation Service were helping. Yet Leraas still did most of the instruction.

There were three sessions in 1954. Eighty-eight teachers attended. Then, on January 7, 1955, a memorandum of understanding was signed between a group of local, State, and Federal agencies concerned with the project.

Under this memorandum the Barnes County Soil Conservation District assumed the 20-year lease and agreed to pay the rent. The State Association of Soil Conservation Districts and the State Soil Conservation Committee agreed to provide funds to give the camp an adequate water and sewage system, additional bunkhouses, a mess hall, a classroom and laboratory, and ground improvements with demonstration plots of trees, grass, and contouring. The State Board of Higher Education agreed that the

Aerial view of Ritchie Memorial Nature Camp on the shore of Lake Ashtabula, N. Dak.

colleges and universities of North Dakota would join with other agencies in creating an academic and policy committee to formulate courses, make recommendations for accrediting courses, and make plans for enrolling more students and providing additional instructors.

A short time later the supervisors of the Barnes County district received contributions from the other North Dakota districts—and active work on the center improvement got underway. A 24- by 60-foot laboratory and classroom, with showers and sewage facilities, was erected. Some ground was landscaped. This was done in time for use by 121 teachers during the three 1955 sessions. The work continued throughout the year until the present seven buildings and ground improvements were ready for the 1956 sessions.

The academic and policy committee met twice in the fall of 1955. Leraas was appointed chairman. The outcome of these meetings was the much enlarged program for the center in 1956.

There were 5 sessions in 1956; 240 teachers attended. A total of 589 teachers, from 1949 through 1956, have attended the center to learn how to teach conservation. Sessions are 1-week long. Three hours college credit are earned per session. A person can stay up to 3 weeks and accumulate additional credits and more conservation knowledge. Sessions are scheduled so there is no conflict with regular college summer sessions.

That first campfire died many years ago. Not so the dream. As Leraas says: "This is a good thing we have here. But it can be better still. Conservation is important. Yet a teacher, to improve a career, must study other things too. I want to see the day come when a teacher can camp at the center, earn career credits, learn to teach conservation—and not have to move from the center to do it."

Demonstration being conducted in outdoor laboratory at Camp Ritchie.

Group Action

Montana gets conservation results by stimulating interest in conservation from all walks of life.

By H. W. RIEK

BACK in 1948 when a small group of conservation minded citizens met to organize the Montana Conservation Council, none of them would have predicted the growth and enthusiasm of membership that the council enjoys today.

Actually, the true beginning of this organization dates back to 1941, when the Montana chapter of the Northwest Conservation League was first established. At that time the chief interest of the group was the conservation and preservation of timber and wildlife resources. This small group of people gradually came to realize that the program should be expanded to include all of the State's natural resources.

Now, after 8 years of existence, the Montana Conservation Council boasts a unique organization, with a membership of 1,300 people from all walks of life. Professional men and women such as doctors, lawyers, teachers, college professors, bankers, are well represented as well as a liberal sprinkling of businessmen, farmers, ranchers, miners, technicians, professional conservationists, and students.

All programs and activities of the council are based on the principle that conservation is everybody's business. In furthering that idea, dues for full membership in the council have been kept at $1 per year. There are contributing memberships for businesses and organiza-

Note.—The author is area conservationist, Soil Conservation Service, Billings, Mont.

tions that go from $5 up, and this is one of the chief sources of income for the group.

There are three principal activities that are carried on annually by the council. These are the conservation caravan, a special statewide conservation week, and the regular annual meeting of the council.

The conservation caravan is a council sponsored activity started in 1949. Arrangements are made with a bus company to transport the carvaners for a whole week. During this time, conservation problems and accomplishments are studied. Each night the caravan is in a different town and more often than not they will be the guests of some industrial concern or civic group. During the day stops are made at points of interest.

The 1956 caravan started at Helena and took in an area through central Montana that included visits to Holter Dam; the smelting plant and wire mill of the Anaconda Copper Mining Company; a visit to a timber cutting area in the national forest; a visit to the Central Montana Experiment Station; coal mines at Roundup, and an oil refinery at Billings. From Billings the group drove over the scenic Cooke City highway through a portion of Yellowstone Park. On the way back to Helena they visited a museum, a Fedral fish hatchery, and a modern sawmill.

Even though the primary objective is education, these trips are exciting and entertaining. Several soil conservation districts offer trips on the caravan as incentives to teachers or as prizes for conservation contests.

Conservation caravan group studying soil samples.

Pulpwood harvest being observed by conservation caravan group.

Montana Conservation Week is another activity sponsored annually by the council. This starts with a proclamation by the Governor. Federal and State agencies, schools and colleges, newspapers, radio stations, and civic clubs participate. The central theme is to bring to everyone's attention the importance of conservation. Special editions of newspapers, radio and TV programs, contests, special programs by garden clubs and civic organizations all help to focus attention on the significance of the week.

The annual meeting of the council is usually held during the last 2 days of Conservation Week and provides a fitting climax to a group of conservation activities that emphasize the importance of conservation to everybody. At this time the annual business meeting of the council is held.

The Montana Conservation Council is incorporated under the laws of Montana. The main business of the council is carried on by a board of 12 directors elected for terms of 3 years each so that the terms of 4 directors expire each year. All officers with the exception of the secretary-treasurer are elected from this board of directors.

Annual meetings are carried out on a town hall principle, to provide a public forum for the study and discussion of specific Montana needs and problems. Usually two items of current interest in the conservation field are selected. Then these subjects are discussed by selected panel members, after which the discussion is thrown open for comments from the floor.

Subjects selected for the 1956 meetings were "Reclassification of Land for Taxation Purposes" and "Montana Groundwater Resources." Attendance at the meeting was 291. This included visitors from two neighboring States who came to find out just what made the Montana Conservation Council click, and to see if something along the same order might be adapted to their States.

Other accomplishments of the council in recent years include: (1) Stimulating conservation education in public schools through teacher workshops and assistance on state legislation; (2) publishing a conservation handbook for teachers; (3) assisting in the establishment of a pilot project for teaching conservation in the public schools of Anaconda; (4) providing speakers for special programs during Conservation Week.

PROGRESSIVE TRUCK FARMER

Amos H. Funk.

Amos H. Funk became interested in soil and water conservation while attending annual meetings of the Lancaster County (Pa.) Soil Conservation District in 1939. He was living and working with his father on an 83-acre rolling limestone farm at the west edge of the village of Millersville. A few gullies were interfering with farming operations and in some places the topsoil was very thin. A Soil Conservation Service employee called one day and started Funk on his conservation work. They visited the Earl Groff farm near Strasburg to see the first broad based terraces constructed in Lancaster County.

They went over the home farm and decided what conservation measures were needed. With the permission of his father Amos began developing a soil and water conservation plan in 1939. In 1950 Amos took over the operation of the farm. That year he was elected to the board of supervisors of the soil conservation district. In 1951 he was named chairman of the board and has held this position since.

His farm had been in the family since 1868 when Funk's grandfather purchased it and started a general farming program. He had a large number of hogs to which he fed the garbage from the nearby State normal school. He had cows and sold the milk on a route through the village. Some small fruits and asparagus were sold to the milk customers.

When the father of Amos took over the farm he continued the general farming program. His wife was interested in the extra money she could get selling vegetables on the Lancaster markets. From this start stemmed the trucking enterprise Amos operates today.

Of the 60 acres of tillable land, 40 are devoted each year to the production of vegetables for the markets of Lancaster. Funk goes to these markets 3 days a week. At times, on Saturday, he attends 3 markets the same day. He also sells cabbage, spinach, and lettuce to the wholesale market.

Amos grows a wide variety of vegetables and small fruits, including 16 acres of sweet corn, 6 acres of celery, 3 acres each of raspberries and sweet potatoes, and smaller acreages of lima beans, radishes, asparagus, tomatoes, cauliflower, broccoli, strawberries, red beets, and peas. He also grows some pansy plants.

This program necessitates intensive cultivation. Sometimes three crops are grown on the same land in one season. To combat this heavy cropping, Funk rests 20 acres every year seeding them to alfalfa and ladino clover that is mowed and left on the land.

To help protect the soil 9,400 feet of broad-based terraces have been constructed, 700 feet of diversions, and 1,200 feet of waterways. To increase production, Funk installed an irrigation system in 1953. The source of water, a neighbor's farm pond, proved inadequate. In 1954 he went to the nearby Conestoga River for his water supply.

This new layout has a pump with 1,000 gallons per minute capacity. Twenty six hundred feet of 8- and 6-inch aluminum pipe serve as the main, while 2,000 feet of 5-inch laterals are used to irrigate the crops.

Amos reports that he likes his conservation farming. No more does he turn around in a field because of gullies. His badly washed soil is slowly coming back into good production. He says that his conservation work has added to the value of the farm.

—W. Martin Muth

Bermudagrass Waterways

Farmers in the Texas "Blacklands" are using bermudagrass, once considered a pernicious weed, more and more as an erosion control plant in their waterways.

By VIRGIL S. BECK

A villain has been reformed, at least from the viewpoint of many farmers of the Blackland Prairie of Texas. Hardly a decade ago, these farmers fought bermudagrass with a vengeance. They considered it a scourge and menace to their cultivated crops. Today, many of these same farmers look upon bermudagrass as one of their greatest allies in fighting soil erosion.

The Blacklands extend from a few miles south of Red River down to San Antonio. The strip is about 400 miles long, and varies in width from about 80 miles in the north to around 20 miles at the southern tip.

Slopes are gentle, about 3 percent or less, on croplands. The soil is deep, fine textured, heavy black clay. The annual rainfall is around 36 to 40 inches, and the soil is highly susceptible to erosion. One of the main problems is to get excess water off the croplands without serious erosion.

And that's why the once detested bermudagrass has come into good favor with Blackland farmers during the last 10 years. The villain has become a sort of hero to a lot of people. The rapid spreading bermudagrass has been one of the best grasses for sodding waterways.

"Grassed waterways are the foundation of the conservation program in the Blacklands," declare Soil Conservation Service technicians. "At least 90 percent of croplands of the area need terraces, and practically all terraced land needs waterways."

Waterways vary from 50 to as much as 250 feet in width, and may be as much as 5,000 to 6,000 feet in length. In establishing grass waterways, farmers usually try to use the natural drains on their land. However, in some instances it is necessary to shape a waterway by

Note.—The author is field information specialist, Soil Conservation Service, Denver, Colo.

Bermudagrass waterway that disposes of water from 45 acres of terraced land in Collin County, Tex.

Bermudagrass waterway that was established in growing cornfield in Collin County, Tex.

plowing to guide the flow of the water.

Bermudagrass is highly favored for sodding waterways in the Blacklands, although some King Ranch bluestem, and coastal bermudagrass are being used. Bermudagrass roots or sprigs are obtained from sandy areas so the dirt can be shaken off easily. These are trucked in at a cost of about 12 cents a cubic foot. Most planting is done by hand. The roots or sprigs are dropped into a furrow and are covered by plowing. Bermuda has been used on approximately 75 percent of the waterways in this area.

King Ranch bluestem is used only on slight slopes, and is seeded instead of being sodded. The waterways usually are made wider to permit the water to flow at shallow depths and low velocity because the grass is not as dense as bermuda, so not as erosion resistant. Flowing water tends to cut around the clumps of bluestem, so careful maintenance is necessary to prevent the washing out of potholes. However, this grass is recommended where competition and maintenance are major problems.

Coastal bermuda is being used on some waterways, particularly around Farmersville, and creates a heavy, dense mat that is highly effective in checking erosion. Roots have to be shipped from Georgia, however, so are rather expensive.

There are a few native tall grass waterways in the Blacklands, and buffalograss has been used occasionally.

Farmers are high in their praise of grassed waterways. "If your land needs terraces, waterways or protected outlets are a must," they declare.

"I recognized the problem of disposing of excess water from my fields several years ago, but didn't know what to do about it," says Herman Robinson, who operates 5 small farms near McKinney, owning 3 and renting 2. He has waterways on 4 of these farms and plans to put 1 on the other.

Robinson bought a 100-acre farm 8 miles northwest of McKinney in 1950. The land was being damaged by sheet erosion. He decided to establish a grassed waterway so the needed terraces could be constructed. There was no depression in the field that might be developed into a waterway, so he constructed one along the fence line. He established the waterway 2 years before he started building his terraces. The land now is terraced and erosion has been checked.

"I used King Ranch bluestem on my waterway, but now I like bermudagrass better," reports Robinson. "I remember that back about 10 years ago, we all hated bermuda, and worked hard to keep it out of our fields. Now I know that you can plow out and kill bermuda any time you want to, so it's no problem."

Most Blackland farmers have some livestock, but many had to sell this year because of the drought. About 40 percent of the land in Collin

KR Bluestem waterway near Wylie, Tex.

Bermudagrass waterway that is used as a hay meadow, near Rhea Mills, Tex.

County where Robinson farms is in pasture. Cotton is the main crop, with some grain sorghums, wheat, and oats being grown.

G. H. Porter, who farms about 8 miles northwest of McKinney, says: "Waterways provide insurance against erosion for the rest of the farm, some grazing, and a little hay." He has 191 acres, of which a 3,000-foot waterway takes 5 acres.

Before Porter established his waterway, drainage from heavy rains crossed in front of his house to a roadside ditch. This created a flood hazard for his buildings. The waterway now empties into a creek at a considerable distance to the rear of his house.

R. F. Newsome, who is administrator for the Rhea estate in the same vicinity, has 12 waterways on 510 acres. He has approximately 20 acres in waterways that provide protected outlets for some 20 miles of terraces on 450 acres of cropland. He uses the waterways for pasture and cuts some hay.

SCS Area Conservationist George Wood reports that during the 1955-56 waterway construction season, 871 waterways were marked out in the 6 soil conservation districts he serves. The land was prepared for 690 waterways, 581 were sodded or seeded, and 446 actually were established and are functioning. Drought prevented successful completion of the others.

Conservationist Wood reports that 15,878 more grassed waterways are needed in the 6 districts.

With the large number of waterways established during recent years, utilization of the grass growth presents a problem for most farmers, points out J. M. (Bud) Norton, SCS work unit conservationist at McKinney.

"Since most fields are not fenced, grass on the waterways cannot be grazed unless electric fences are set up to keep livestock out of the fields," Norton says, "If the grass isn't grazed, then it can be mowed, baled and used, or sold. But the greatest value of the waterways is to prevent erosion of valuable cropland rather than for production."

Until recent years, some farmers allowed their waterways to empty into roadside ditches. This often resulted in serious damage to roads and highways with gullies sometimes cutting back into fields for 500 feet or more. Where it

Gully formed from a V-ditch used as a terrace outlet near Wylie, Tex.

is necessary to drop water to lower levels, stabilizing measures are required to prevent overfalls, or head cutting, SCS technicians point out.

Drop inlets are being used to solve this problem, particularly around Farmersville. An earthen dam is constructed across the waterway at the edge of the roadside ditch and an L-shaped drop inlet of corrugated pipe installed. The upright part of the structure is in front of the dam, and connects to the horizontal pipe that leads through the dam and to the roadside ditch.

Drop inlets may vary from 24 to 72 inches in diameter, depending upon the size of the drainage area. They may cost from $500 to $1,500, depending upon the size needed to handle the water. For example, a 54-inch pipe to handle drainage from 70 acres near Farmersville cost about $1,500. Concrete pipe is cheaper, but the weight causes the joints to settle and break the pipe, so it soon becomes useless. About 20 drop inlets have been installed around Farmersville.

INVENTORY IN NOVEMBER

A New Mexico sheep rancher takes an inventory of both livestock and forage each fall and plans the next year's operations accordingly.

By CLEMENS F. WEINDORF

TAKING inventory in November may seem strange to folks in the business world who are accustomed to count their assets and liabilities at the end of the calendar or fiscal year. But for the rancher, the end of the growing season is the time for him to go to market with his product. He has a fine crop of calves or lambs. At the same time he takes inventory of the forage he has available for the next year to produce another crop of beef, mutton, or wool.

Taking inventory of the available forage on his ranch has been considerably easier for John Cauhape, of Pinon, N. Mex., since he adopted a circular or rotational system of deferred grazing. Some folks call his grazing principles circular grazing, others call it rotational deferred grazing. Under either title it has meant more grass for more lambs and more cash for less work than the older and less controlled method of grazing found on many ranches.

The ranch that Cauhape owns and manages covers approximately 105 sections at the base of the Guadalupe Mountains near Pinon, N. Mex. Due to the odd shape of the ranch, being 25 miles long, with the widest point only 6 miles, many problems in proper management were encountered.

Upon becoming a cooperator with the Penasco Soil Conservation District in 1954, Johnnie, as most of his friends call him, became acquainted with some of the ecological features of the vegetation on his ranch. He found out that all of the vegetation in his pastures was not of the most palatable and highest yielding species that he could grow. He became familiar with the terms vigor and density as applied to range cover. He began to realize that through years of continuous heavy grazing together with extreme droughty conditions that many of the better or more palatable and high forage yielding grasses were very weak, and in many cases dead, exposing the surface to severe wind and water erosion in many areas.

Careful observation by Cauhape, along with the Soil Conservation Service conservationist, showed that the sheep were grazing only the better, native grasses and leaving the less desirable species untouched, giving them a chance to grow in vigor and reseed. "I guess sheep are

A typical pasture scene on the John Cauhape ranch.

Note.—The author is work unit conservationist, Soil Conservation Service, Capitan, N. Mex.

just like my little boy and girl," Johnnie stated, "My boy and girl would rather eat ice cream any day than the vegetables we place in front of them. I guess that is the way with these sheep on the better and poorer grasses."

From these observations, Cauhape realized that a systematic grazing program had to be initiated to give the desired forage a chance to build up in vigor and reseed the bare areas.

Only 33 years old, Cauhape was born into a family of sheep raisers. His father, John Pete Cauhape, founded the headquarters of the present ranch in 1911. Today, Johnnie is trying to see that the family name will remain closely linked with the wool and lamb production industry in New Mexico for many years to come. He decided to defer grazing on two thirds of his ranch at a time and graze only one third, changing thirds every 6 months. Through this system, on the pastures that are not grazed during the growing season, the grasses are given a chance to build up in vigor and reseed, without interruption from frequent clippings.

The area being grazed is stocked somewhat heavier by bunching the livestock on one third of the ranch. By stocking these areas heavier for a short period, the sheep are forced to graze the undesirable grasses such as three-awn, ringgrass, and burrograss as well as the more palatable species. This has a twofold reaction. First, all of the forage being grown is utilized and turned into more pounds of wool, mutton, or beef. Secondly, the undesirable species are put into direct competition with the better grasses by being grazed frequently. The rate of stocking is regulated to prevent grazing the grasses to the extent that they are killed out completely. The result is that the unpalatable grasses and weeds are lowered somewhat in vigor and are not given a chance to reseed as profusely as they would be able to do when the pastures are grazed by smaller numbers on a yearlong basis.

The sheep are moved into a new third at the time of shipping and shearing, usually in March and October. In this way each third of the ranch is given 2 years (growing seasons) of rest before it is grazed again while growing.

"I've never dreamed that grass could come back in a year or two, once it was down and nearly killed out," Cauhape said. "But I've seen it done on my own ranch even during these dry years. If you let that grass have a chance to grow, it will take care of itself and you."

Fence line on the Cauhape ranch separates a grazed pasture from one on which grazing was deferred.

The deferred rotational grazing management program is sufficiently flexible to increase or lower the number of livestock on the ranch according to the moisture received and forage produced. During seasons of drought and low forage production Cauhape is not at the mercy of the market to ship off at once. He can do this over a period of 6 months or more, due to the forage he has in reserve on the ungrazed portions of his ranch.

"The way a rancher uses his grass, is the way he expects things to be in the future." John stated, "I've got a program that will show me just where my herd stands in relation to the amount of grass available, and that's the way it will stay."

STUBBLE MULCH FARMER

(Continued from page 179)

Pete Loos is chairman of the South Platte Soil Conservation District board of supervisors, and he practices what he preaches. He has contour stripcropping, grass waterways, grass seeding, wildlife plantings, shelterbelts, diversion dams, water spreading, and terraces on his land.

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON 25, D. C.

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300
(GPO)

PUBLIC LIBRARY
FEB 23 1957
DETROIT

REVIEWS

IRRIGATION ENGINEERING, Vol. II. By Ivan E. Houk. 531 pp. Illustrated. 1956. New York: John Wiley & Sons, Inc. $14.

THIS book is the second of two volumes on irrigation engineering. It is devoted primarily to the planning of large gravity irrigation projects and the factors that must be considered in the design of the structures that are required to make such projects operate properly.

The first 4 chapters are concerned primarily with the planning phase of the large irrigation project, and the remaining 12 chapters discuss in detail the various structures that may be required to insure proper functioning.

The author has drawn rather heavily on the experience of the Bureau of Reclamation, and many of the structures cited and illustrated are now operating successfully on existing Bureau projects.

Numerous illustrations are included that have been selected from a wide range of conditions and show the application of the principles of design covered in the text.

The author has skillfully discussed the numerous factors that must be considered in the design and installation of various types of irrigation structures, including new criteria that has been developed in recent years, without getting unduly involved in the basic details of design that are covered in other books. A comprehensive and useful list of references is included at the end of each chapter for those who desire to study additional material on the subject.

—T. H. QUACKENBUSH

CALIFORNIA AND THE SOUTHWEST. Clifford M. Zierer, editor. 376 pp. Illustrated. 1956. New York: John Wiley and Son, Inc., $11.25.

THIS is truly a great source book on facts about California, New Mexico, Nevada, Utah, and Arizona. There are 34 chapters written by 32 southwestern authorities.

Millions of people have been crowding into the Pacific Southwest during the past generation, and this extraordinary trend continues unabated. The desirability of large concentrations of people in any area should be evaluated in terms of natural resources and economic opportunities to support growing populations.

The editor says that this book was written in hope that it might contribute to a better understanding of the people, resources, industries, problems, and potentialities of the region. This goal has been reached in a generous measure for the potential settler can get from this volume a mass of interrelated facts on natural resources, culture, business, agriculture, mining, transportation, manufacturing and population patterns, and political relationships. Also, there are numerous illustrations, maps, and charts that will aid the reader to better understand the text.

B. W. ALLRED

QUACKGRASS CONTROL.—One of the newer chemical weed killers has proved itself for controlling quackgrass in potato fields, according to John Schoenemann, horticulturist at the University of Wisconsin. He says dalapon is a safe, low-cost quackgrass control in potatoes.

Land that received no dalapon and was fall plowed only, yielded 400 bushels to the acre. Land with the quack cultivated 6 times the preceding fall yielded 420 bushels. Ten pounds dalapon per acre in the fall upped the yields to 502 bushels. But land with 5 pounds dalapon in the spring yielded 660 bushels.